

Predicting Bacterial Concentration on the Nation's Beaches

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Key Words: beaches, bacteria, water, plumes, public health

A classical example of the failure of institutions and environmental technology to protect the nation's aesthetic, recreational, and public health values is represented by the July-August, 1999 Huntington Beach, California beach closure. This multi-million dollar regional public health disaster (high bacterial concentrations) affected perhaps a million vacationers and may be compared with major environmental disasters, such as the Exxon Valdez oil spill, in shaping public perceptions. The short-term result was the abandonment, under intense political pressure, of the local sanitation district's 301(h) waiver of secondary treatment privileges. As an important discharger in the area, it has committed to upgrade to full secondary treatment and to chlorine disinfection of the effluent discharged more than four miles offshore, at a capital improvement cost estimated to range from \$250M to \$400M.

However, an independent science review of extensive monitoring data has yet find a strong link between offshore plume concentrations and distribution and surf zone elevated bacterial levels, the two regions being separated by bands of much lower concentrations. There are indications that other sources—a power plant's effluent also serving combined sewer overflows, the Santa Ana River, a bird sanctuary, public toilets, and unidentified renegade sources—may be important determinants of surf zone pollution. Meanwhile, bacterial sampling typically requires 48-hour incubation times, severely decreasing the ability of bacterial monitoring programs to both protect public health and optimize public access to beaches.

This project envisions the formulation of a model, working title Visual Beach, to be based on the EPA Visual Plumes program and other models and water circulation estimation techniques. In collaboration with the Orange County Sanitation District, it will be tested against routine monitoring conducted by the District. If successful, the model may help develop effluent disinfection that will prevent high waste-field concentration when shoreward movement is forecasted. Secondly, the model may help identify other potential sources contributing to the high bacterial levels, leading to their remediation. The ultimate product will utilize telemetered real-time monitoring data and fluid dynamical models and prognostic products to predict surf zone bacterial concentrations with enough lead time to allow for adequate disinfection of the district's effluent, identification of contributing sources, and health advisory lead times.

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